

**REVIEW ARTICLE**

**Assessment of initial differences between inpatients and outpatients receiving pain therapy in Germany: the KEDOQ-Pain quality assurance system**

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**Abstract**

KEDOQ-Pain is a quality assurance system for documentation and quality management of pain therapy under different treatment settings initiated by the German Pain Society. We used KEDOQ-Pain data to describe initial differences in sociodemographic, pain-related and psychological factors between pain patients receiving pain therapy in inpatient or outpatient treatment settings.

Our data, collected by the German Pain Questionnaire (DSF), comprised information on pain patients receiving out- and inpatient therapy (n=4,705). Statistical analysis was carried out by descriptive and comparative data analysis using uni- and multivariate statistical methods.

Patients receiving inpatient pain therapy were significantly older, more often female and had more often multiple pain localizations. They reported greater pain intensity, had a higher stage of pain chronification and higher pain-related disabilities. They showed higher levels of anxiety, depression and stress and had a lower quality of life. Significant group differences, however, had only small effect sizes. Even though multivariate analysis revealed most predictors of treatment in an inpatient setting to be significant, taken as a whole they explained less than 5% of the observed variance.

Criteria underlying the current practice of allocation of patients to inpatient or outpatient pain therapy remain unclear. Our analysis suggests that highly chronified pain will increasingly be the challenge of future pain management, requiring professional competence from a multidisciplinary specialist team.

**Keywords:** KEDOQ-Pain; quality assurance; healthcare research; treatment setting; pain therapy

## 1 Introduction

A comparison of chronic pain patients in outpatient and inpatient treatment settings regarding sociodemographic, pain-related and psychological characteristics has not yet been systematically analysed. However, hypotheses on potential differences between these two groups can be derived from previous studies in which patients undergoing treatment under different settings are described<sup>1-5</sup> and also from the manual of the German Pain Questionnaire (DSF)<sup>6</sup>, where data on the different settings are provided. Results of these studies and also the data from the manual of the DSF suggest that patients in an outpatient treatment setting

- are slightly younger and more often male,
- report more often headache as major pain,
- report less often back pain as major pain,
- have a shorter duration of illness,
- report less pain intensity and fewer pain-associated impairments,
- show less pronounced pain chronification
- and describe a better health-related life quality,

compared to those receiving inpatient treatment. Thus, the typical characteristics of chronic pain as well as degree of

chronification seem to be less pronounced in patients treated in an outpatient compared to those in an inpatient treatment setting.

KEDOQ-Pain is a basic tool for documentation and quality management of pain therapy<sup>7</sup>. It was developed by the German Pain Society (Deutsche Schmerzgesellschaft e.V.) as the data basis for nationwide, cross-sectional and independent scientific research in health services in Germany. Information on quality control regarding diagnostic processes and therapeutic effects of pain therapy can be obtained from facilities offering treatment to chronic pain patients. KEDOQ-Pain enables merging of cross-settings and cross-sectional data from these facilities. This, in turn, enables determination of the presence, if any, and the extent of differences in characteristics between inpatients and outpatients.

In this study, we used the KEDOQ-Pain dataset ([https://www.kedoq-schmerz.de/download/KEDOQS\\_Kerndatensatz\\_2015\\_3.pdf](https://www.kedoq-schmerz.de/download/KEDOQS_Kerndatensatz_2015_3.pdf)) to describe differences in sociodemographic, psychological and patient-associated characteristics and diagnostic between inpatients and outpatients in a large representative sample of pain patients treated in German pain therapy facilities. The aim of this evaluation was to examine whether there were differences between patients offered

inpatient or outpatient treatment and if so, how marked these differences were. Furthermore, we also wanted to find out if patient allocation to one or the other treatment setting was already made according to some assignment criteria.

## 2 Materials and methods

The KEDOQ-Pain data included information on 4,705 pain patients (outpatient: n=2,682; inpatient: n=2,023) treated in 13 clinics collected between January 2012 and April 2016. Sociodemographic, pain-related and psychological data were collected using the German Pain Questionnaire (DSF) at the beginning of treatment; in addition, information on pain chronification and pain localisation was provided by practitioners. To stage pain chronification, the Mainz Pain Staging System<sup>8</sup> was used, and for pain grading the grading system of von Korff<sup>9</sup>. Health-related quality of life was assessed by the Short-Form 12<sup>10</sup>, depression, anxiety and stress by DASS<sup>11</sup> and well-being by the MFHW<sup>12</sup>.

Statistical analysis was carried out by descriptive and comparative data analysis using uni- and multivariate statistical methods. As effect size for metric variables, Cohen's  $d^{13}$  with pooled standard deviation, and for categorical data Cramer's  $V$  was calculated. The accepted interpretation is a value of  $d = 0.2$  and

Cramer's  $V = 0.10$  as indicative of a small effect size. Pain-related factors for inpatient treatment were calculated by multivariate analysis in the form of a risk characterization ratio (Odds Ratio) and Nagelkerkes  $R^2$ . Statistical significance was considered at  $p < 0.05$ .

## 3 Results

KEDOQ-Pain data from 13 different therapeutic centers comprising 4,705 patients were analyzed in this study. Six out of 13 centers offered both outpatient and inpatient treatment, three offered only outpatient and four only inpatient treatment.

### 3.1 Sociodemographic data

Patients included in this study were on average 56.8 years old, and 65.9% were females. Inpatients were significantly older ( $58.3 \pm 15.1$  y vs.  $55.7 \pm 14.2$  y,  $p < 0.001$ ;  $d = 0.17$ ) and more often female (67.7% vs. 64.5%,  $p < 0.05$ ;  $V = 0.03$ ).

### 3.2 Pain characterization

For 34.6% of the patients ( $n = 1627$ ), only a single pain location was reported by the treating physician. Within this group, lower-back pain (21.5%), leg pain (20.2%), head/facial pain (20.7%) and shoulder-arm pain (21.5%) were predominant, with head/facial pain in

particular being reported more often by outpatients (24.8% vs. 14.3%;  $p < 0.001$ ). More than a single pain location was reported by 65.4% of the patients. Hospitalized patients complained more often of lower-back pain (58.0% vs. 50.6%,  $p < 0.001$ ;  $V = 0.03$ ) and much less often of head/facial pain (19.9% vs. 29.0%,  $p < 0.001$ ;  $V = 0.10$ ). More than half of the patients (55.7%) had a pain duration of more than five years; there were no differences in pain duration between patients in the different treatment settings ( $p = 0.30$ ). The average data on the mean, the highest and the current pain level exceeded the value 5 on the numerical rating scale ranging from 0 to 10 (NRS: 0 = no pain, 10 = worst pain imaginable). The acceptable pain level upon successful treatment was reported as 3.5 (SD = 2.0). Those receiving inpatient treatment reported significantly higher

current pain levels as well as significantly lower tolerable pain levels. Group differences had effect sizes of  $d < 0.20$ . The number of days within the last three months during which daily activities could not be pursued due to pain ( $p < 0.001$ ,  $d = 0.24$ ) was substantially larger among inpatients. With respect to grading of chronic pain<sup>9</sup>, inpatients more often had stage IV pain (51.9% vs. 41.7%). However, the differences in the grading between the treatment settings were overall low ( $V = 0.11$ ). Figure 1 shows the distribution of patients staged according to the MPSS of pain chronification, with more than half of them (51.3%) assigned to stage III. With respect to the treatment setting, inpatients were more often categorized to stage III (56.5%) as compared to outpatients (47.5%;  $p < 0.001$ ;  $V = 0.11$ ).

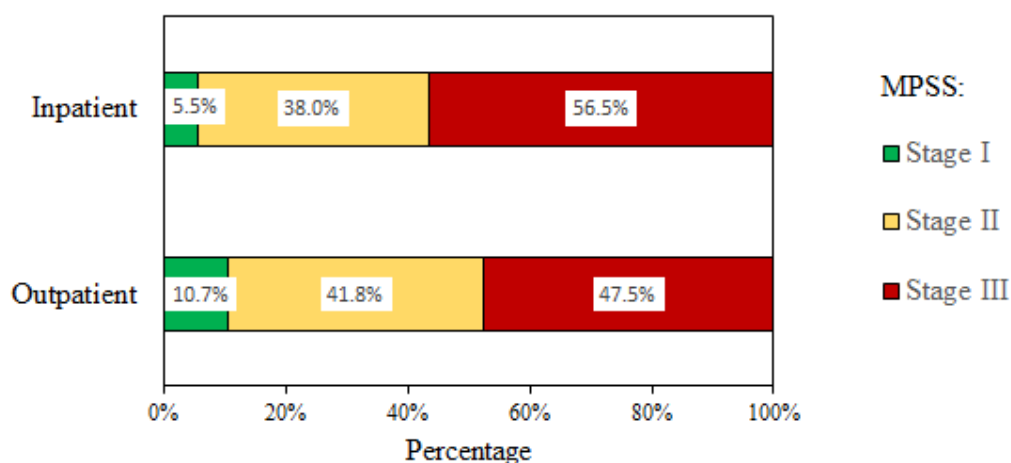


Figure 1: Distribution of pain-chronification Mainz Pain Staging System (MPSS) for inpatient and outpatient setting.

### 3.3 Psychometric data

In comparison to outpatients, those receiving inpatient treatment reported a significantly worse physical and psychological quality of life in the SF-12, had higher depression, anxiety and stress levels according to the DASS and also reported a substantially lower habitual

well-being. Statistical group differences were low for habitual well-being (MFHW) with  $d = 0.21$  and ranged between 0.14 and 0.20 for the other scales. Figure 2 summarizes the effects in group-differences between inpatient and outpatient setting.

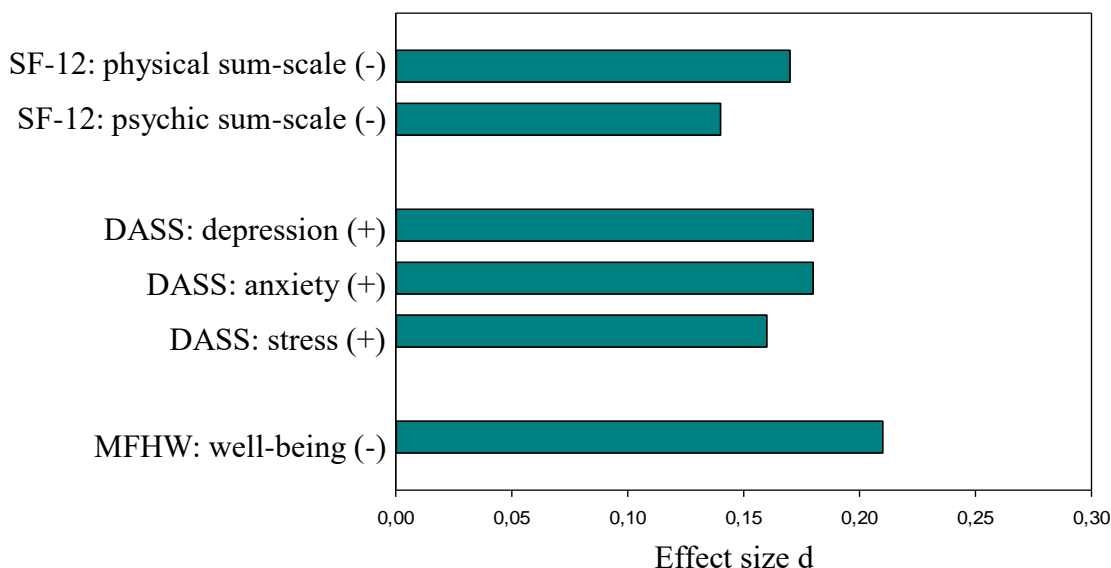


Figure 2: Effect size (Cohen's d) between outpatient and inpatient treatment settings for psychometric parameters.

SF-12: health-related quality of life; DASS: Depression Anxiety and Stress Scale; MFHW: Marburg questionnaire habitual well-being. Group-differences are significant for all scales ( $p < 0.001$ ).

(+): inpatients have higher [(-): less] scale values than outpatients.

### 3.4 Pain treatment

Many patients reported previous treatment experience with medication (80.8%) and physiotherapy (64.7%). One in four had received psychotherapy (27.7%). In general, inpatients had more often previous experience with different pain treatment methods.

### 3.5 Multivariate analysis

For deriving the allocation of patients to the outpatient treatment by taking several clinical features into account, a logistic regression (forced entry) with the following predictors was conducted:

- Area of pain
- Number of pain locations

- Pain chronification (MPSS)
- Pain intensity
- Pain-associated impairment
- Number of days with pain-related impairment within the last three months
- Depression (values higher than 10 on DASS-Depression Scale)

predictors for inpatient treatment setting in multivariate analysis were significant, in total they explained less than 5% of variance. The significant risk characterization ratios (odds ratio) ranged from 1.2 (2-3 pain localizations) and 2.0 (MPSS-stage III). Nagelkerkes  $R^2$  was 0.048.

The result of this multivariate analysis is shown in Table 1. Even though most

**Table 1:** Logistic regression to predict allocation to inpatient treatment

Parameter	P-value	Manifestation	Prevalence inpatient allocation (%)	Odds ratio	95% CI
Pain region	<0.001	Head/face	34.0	reference	
		Back and leg	46.5	1.6 ***	1.3 – 1.9
		Rest	44.1	1.5 ***	1.2 – 1.8
Pain localization (number)	0.02	One location	39.6	reference	
		2-3 locations	45.9	1.2 *	1.1 – 1.4
		>3 locations	42.9	1.0	0.8 – 1.2
Pain chronification (MPSS)	<0.001	Stage I	27.8	reference	
		Stage II	40.5	1.6 ***	1.3 – 2.1
		Stage III	47.2	2.0 ***	1.5 – 2.5
Pain intensity	0.91	Low	39.1	reference	
		High	43.4	1.0	0,8 – 1.3
Pain-associated impairment	0.04	Group 1	35.5	reference	
		Group 2	43.7	1.1	0.8 – 1.5
		Group 3	43.1	1.0	0.7 – 1.2
		Group 4	43.8	0.9	0.7 – 1.1
Pain-associated days of impairment	<0.001	No day	35.9	reference	
		< 3 months	46.9	1.7 ***	1.4 – 1.9
		3 months	48.5	1.6 ***	1.4 – 1.9
Depression (DASS-D)	<0.001	Value < 10	32.7	reference	
		Value ≥ 10	40.4	1.3 ***	1.1 – 1.5

Pain intensity: mean of the highest, the current and average pain level; classification of pain intensity according to manual DSF: up to 4.9 as low and higher than 5.0 as high.

Pain-associated impairment: mean of the three scales in pain-associated impairment in everyday life, leisure time and work; classification according to manual DSF. Group 1: 0-2.9; Group 2: 3.0-4.9; Group 3: 5.0-6.9; Group 4: 7.0-10.0.

Nagelkerkes  $R^2 = 0.048$ ; CI: confidence interval; \*\*\*:  $p < 0.001$ ; \*:  $p < 0.05$

#### 4 Discussion

The cross-sectional quality management system KEDOQ-Pain is recommended by the German Pain Society and is being increasingly used in German pain society clinics. Moreover, it is appropriate for answering questions arising in scientific healthcare research. However, it must be pointed out that in this study, evaluations are not based on a "random sample" of pain therapy facilities. The participating centers probably represent a selection of highly dedicated institutions. This must be seen as a limitation of the present study. Only with a wider use of KEDOQ-Pain as a routine documentation system will future representative analyses be possible.

Our analysis shows a markedly high proportion of patients with the highest pain chronification level. In our sample, 51.3% of patients had MPSS stage III; in the study of Frettlöh et al.<sup>14</sup>, this was 39.0% and in the study of Gerbershagen et al.<sup>15</sup>, 35.8% patients had stage III MPSS. The highest chronification stage was seen in 47.5% of outpatients and 56.5% of inpatients of our sample group. Thus, there seems to be an increase in the number of patients with high degree of pain chronification receiving pain treatment. Effective therapy of such patients requires a multidisciplinary treatment team with high-level professional competence.

Compared to patients in an outpatient treatment setting, inpatients show more distinct pain and a lower overall quality of life. They are generally older and more often female and more often have the highest pain stage of chronification. The typical characteristics of a pain disorder are overall more pronounced in patients treated on an inpatient basis.

However, our analysis showed that the size of the differences between the treatment settings was almost insignificant and this is in agreement with the data of the DSF manual<sup>6</sup>, according to which differences between the treatment settings can be demonstrated at best with weak effect strength. This means that no single patient characteristic or combination of characteristics including socio-demographic, pain-associated and psychological factors describes allocation of patients to one or the other treatment setting.

Thus, our analysis does not clarify according to which criteria allocation to inpatient or outpatient treatment is made. Besides clinical criteria, it must be assumed that factors such as patient preference, clinical allocation procedures and the geographic availability of pain facilities also have a significant influence on the process of patient assignment to different treatment settings. For adequate pain therapy, different treatment settings to



meet the needs and preferences of pain patients have to be available, which currently is not the case in Germany<sup>16</sup>. Furthermore, it is recommended that a multidisciplinary assessment of all pain patients be conducted prior to start of any pain treatment and allocation to treatment in a particular setting – inpatient or outpatient - be based on the results of such assessment.

### **Conflict of interest**

S. Kükenshöner, K. Böhme, F. Bosse, R. Casser, T. Kohlmann, G. Lindena, M. Pfingsten, F. Petzke, B. Nagel and M. Hüppe certify that there exists no conflict of interest.

The analysis was conducted after the positive vote of the ethics committee of the University of Lübeck and the ethics board of the German Pain Society (Deutsche Schmerzgesellschaft e.V.)

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